

REMARKS

Claim Rejections 35 U.S.C. § 112, second paragraph

The Examiner has rejected claims 31-54 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In the opinion of the Examiner, the term "as thin as possible" in claim 31 is a relative term that renders the claim indefinite.

Applicant respectfully disagrees with the Examiner. Applicant believes that the term "as thin as possible" in claim 31 and claim 40 is definite since the specification provides a standard for ascertaining the requisite degree, allowing one of ordinary skill in the art to be reasonably apprised of the scope of the invention.

The second material (312) in claim 31 is formed as thin as possible while still providing a suitable hermetic seal for a chip. See Figure 3g. See lines 14-15 on page 10 of the specification. A layer is said to be hermetic if it can prevent moisture penetration under humid ambients at normal chip operating temperatures, generally between 100-120 degrees Centigrade. See lines 12-13 on page 10 of the specification. In one embodiment of the claimed invention, the second material (312) has a thickness between 500-1,500 Angstroms. See line 17 on page 10 of the specification. In another embodiment, the second material (312) has a thickness of less than 1,000 Angstroms. See line 21 on page 10 of the specification.

Claims 32-39 are dependent on claim 31. Claims 41-54 are dependent on claim 40. Applicant believes that these dependent claims are also definite for the same reasons as set forth above.

Thus, Applicant does, in fact, particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In view of the foregoing,

Applicant respectfully requests the Examiner to withdraw the rejections to claims 31-54 under 35 U.S.C. § 112, second paragraph.

Claim Rejections 35 U.S.C. § 103 (a)

Claims 31-35 and 37-54

The Examiner has rejected claims 31-35 and 37-54 under 35 U.S.C. §103 (a) as being unpatentable over Efland et al. (US 6,025,275) in view of Byrne (US 5,136,364).

Applicant respectfully disagrees with the Examiner. It is Applicant's understanding that the cited references of Efland et al. and Byrne, individually or collectively, fail to teach or render obvious Applicant's invention as claimed in claims 31-35 and 37-54. Applicant teaches and claims a method of fabricating a device which has low bond pad-to-adjacent metal member capacitance and which provides a hermetic seal of the substrate.

Applicant's claimed invention teaches a method to keep capacitance low in a device by forming a first material (310) over a bond pad (304) and a first member (306), where the first material (310) has a low dielectric constant and has a thickness that is sufficient to completely fill a gap (308) between the bond pad (304) and the first member (306). See Figure 3g. The gap (308) between the bond pad (304) and the first member (306) is completely filled with the low dielectric constant material (310) so as to obtain low capacitive coupling between the bond pad (304) and the first member (306). The result is improved (faster) device performance. See lines 7-10 on page 8 of the specification. Applicant further forms a second material (312) over the first material (310). The second material (312), which is hermetic and has a high dielectric constant, is kept out of the gap (308) between the bond pad (304) and the

first member (306) so that the capacitive coupling between the bond pad (304) and the first member (306) will not be increased.

In contrast, the cited reference of Efland et al. teaches the filling of a gap between a bond pad (20) and a first member (20) with a dielectric layer (22) composed of an oxide (first material) and a nitride (second material). See Figure 1A. Also, see lines 42-45 in Col. 3. Thus, Efland et al. fails to teach that the nitride, which has a high dielectric constant, should be kept out of the gap in order to avoid increasing capacitive coupling between the bond pad (20) and the first member (20).

Applicant's claimed invention further teaches a method to prevent moisture penetration into a device by forming a hermetic second material (312) over a first material (310), forming an opening (316) through the second material (312) and the first material (310), and forming a hermetic third material (318) over the second material (312), the sidewalls (317) of the opening (316), and the top surface of a bond pad (304) to seal the edges of the second material (312) and the edges of the first material (310) to prevent moisture penetration into the device. See Figure 3e. Also, see lines 13-14 on page 11 of the specification.

In contrast, the cited reference of Byrne teaches the forming of an opening through a first material (12) to expose a top surface of a bond pad (11), the forming of a second material (18) over the first material (12) and the exposed top surface of the bond pad (11), and the forming of an opening through the second material (18). Thus, Byrne teaches a "wraparound effect" which results in an opening with sidewalls that only include the edges of the second material (18), which is nitride, and that do not include the edges of the first material (12). See Figure 4. Also, see lines 30-34 in Col. 2 and lines 1-3 in Col. 3.

The Examiner has not shown any reason, suggestion, or motivation in the cited references to combine the teachings. The first cited reference of Efland et al. teaches that bonding directly to thick plated interconnects, such as Copper, would enhance the performance of integrated circuits by eliminating the high parasitic

series resistance associated with bond pads and standard multi-level VLSI metal systems. See lines 25-26 and lines 31-34 in Col. 1. No mention is made of reducing capacitance at all between the metal lines. Efland et al. further teaches the use of a dielectric layer (22), composed of oxide and nitride, to isolate the initial semiconductor structure (10) from subsequent integrated circuit processing. See Figure 1A and lines 40-42 in Col. 3. However, no mention is made of preventing moisture penetration into the device.

The second cited reference of Byrne teaches a hermetic packaging, but is otherwise only concerned with a three-metal layer sequence: aluminum (14) for initial adherence to an aluminum bonding pad (11), a barrier metal layer (15) for isolation of the aluminum from the noble metal, and a noble metal (16), such as Gold, for corrosion resistance and electrical contact. See Figure 4 and lines 35-46 in Col. 2. No mention is made of reducing capacitance between metal lines.

Consequently, Applicant submits that the two references cited by the Examiner do not, individually or collectively, teach, suggest, or render obvious the invention as claimed by the Applicant. Instead, the Examiner has impermissibly used hindsight and the teachings of the present invention in forming his rejection.

Claim 36

The Examiner has rejected claim 36 under 35 U.S.C. §103 (a) as being unpatentable over Efland et al. (US 6,025,275) in view of Byrne (US 5,136,364) and further, in view of Lou (US 5,759,906).

In the opinion of the Examiner, it would have been obvious to a person of ordinary skill in the art to modify the process of Efland et al. to include a layer comprising fluorine atoms as taught by Lou. See lines 65-67 in Col. 1.

Applicant respectfully disagrees with the Examiner. In Applicant's claimed invention, the gap between the bond pad and nearby metal interconnect is

completely filled with a first material doped with fluorine atoms so as to obtain low capacitive coupling between the bond pad and the nearby metal, which results in improved and faster device performance. See lines 7-10 on page 8 of the specification.

In contrast, the fluorine-containing layer (23) of Lou is shown as being above the bond pad (16), instead of being between the bond pad and nearby metal interconnect as in Applicant's claimed invention. See Figure 7. Also, see lines 56-58 in Col. 6.

As a result, combination of the methods of Efland et al., Byrne, and Lou will not produce the method claimed in Applicant's invention. Consequently, Applicant submits that the three references cited by the Examiner do not, individually or collectively, teach, suggest, or render obvious the invention as claimed by the Applicant. Reconstruction of Applicant's invention only with the benefit of hindsight is insufficient to present a prima facie case of obviousness.

Conclusion

In view of the foregoing, Applicant respectfully requests the Examiner to withdraw the rejections to claims 31-54 under 35 U.S.C. §103 (a).

Applicant believes that all claims pending are now in condition for allowance so such action is earnestly solicited at the earliest possible date.